DOCUMENT RESUME

ED 039 418 AC 006 763

TITLE A Guide to Job Analysis for the Preparation of Job Training Programmes.

INSTITUTION Ceramics, Glass, and Mineral Products Industry Training Board, Harrow (England).

PUB DATE Feb 68

NOTE 16p.; Information Paper No. 3

EDRS PRICE EDRS Price MF-$0.25 HC-$0.90

DESCRIPTORS Case Studies, *Educational Needs, *Industrial Training, *Job Analysis, Job Skills, Job Training, *Mechanical Equipment, Orientation, *Program Planning

IDENTIFIERS Great Britain

ABSTRACT

The paper deals with job analysis for the preparation of job training programs. The analytical approach involves five steps: enlisting support, examining the job, describing the job, analyzing training requirements, and planning the programs. Appendixes include methods of producing training schemes--the simple job breakdown, straightforward analysis of a job of medium complexity (the loading gateman in a crushed stone quarry), and detailed analysis and breakdowns of a complex job (face shovel driver in a quarry); also included is a case study of job analysis in a company employing 800 people. (EB)

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Ceramics Glass and Mineral Products Industry Training Board

INFORMATION PAPER 3

ED039418

A GUIDE TO JOB ANALYSIS FOR THE PREPARATION OF JOB TRAINING PROGRAMMES

STEP 1 — ENLIST SUPPORT OF ALL CONCERNED

STEP 2 — EXAMINE THE JOB BY WATCHING AND QUESTIONING

STEP 3 — DESCRIBE THE JOB BY SIMPLE STATEMENT OF FUNCTION

STEP 4 — ANALYSE JOB TRAINING REQUIREMENTS BY:—

- IDENTIFYING SKILLS AND KNOWLEDGE BROADLY
- BREAKING DOWN SKILLS AND KNOWLEDGE IN DETAIL REQUIRED
- SUMMARISING JOB TRAINING REQUIREMENTS IN SYLLABUS

STEP 5 — PLAN TRAINING PROGRAMME

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INTRODUCTION

This Information Paper aims to present a simple analytical approach to the preparation of job training programmes. This is described in five basic steps, and is equally appropriate to all companies whatever their size or product. The paper indicates what information is required at each step, and outlines the most satisfactory way of obtaining it.

The approach is given in broad outline only, but is illustrated in detail by examples in the appendices to the paper.

THE FIVE STEP APPROACH

The analytical approach to the preparation of job training programmes should be based on the following five steps:

1. Enlist support.
2. Examine the job.
3. Describe the job.
4. Analyse the training requirements.
5. Plan a programme of training.

This approach should be used for all jobs from any type of department. It is equally appropriate in the office, the works, the servicing and the maintenance sections. It may be used for most jobs: operative; craft; technician; clerical; and certain supervisory tasks. The amount of detail required will depend upon the job being studied.

IMPLEMENTATION OF THE FIVE STEP APPROACH

1. Enlist support

This is an essential preliminary step, for without the co-operation and support of all concerned, the resulting job programme will be incomplete and useless. Support must be enlisted at all levels.

Senior Management

The support of senior management is essential. They will be concerned primarily with the cost and effectiveness of a job training programme. Their personal involvement will also give the necessary encouragement to all levels of trainers and trainees.

Departmental Managers and Supervisors

The support of departmental managers and supervisors is required to determine acceptable methods of operation and standards of performance.

They will confirm that the analysis is based on the best possible practice and not just the best practice of any one individual in the department under review. They will take a controlling interest, and an active part, in the training. By providing a constant assessment of the trainee's progress, they will check the efficiency of the training and the design of the training programme.

The Person who is at present performing the Job

It is the job holder's skill and knowledge that is being analysed and built into the job training programme. He must be given every encouragement to give maximum co-operation.

Workers' Representatives

The support of trade unions, or workers' representatives on joint consultative committees, is necessary if maximum co-operation is to be expected. They should be assured that the sole objective of the analysis is the preparation of job training programmes.

2. Examine the job

This is the preliminary examination of the job to find out in broad outline what is involved in its successful performance. It will enable the person making the analysis to describe the job accurately and to identify the training requirements. A key phrase in the whole of this task is 'watch and question'. It is important to examine the whole job from start to finish, so that nothing will be left out of the ultimate training programme.

The analyst will probably start by questioning the job holder on the nature of the task and the responsibilities involved. (A list of the likely questions can be found in Appendix 4.) After this, a period of time should be spent in closely observing the job being performed. The observer will have to identify the knowledge upon which the operator is calling in order to perform the task. He will frequently have to ask the job holder—"why?".

3. Describe the job

The job is then described in the *job description.* This is the basic document and it will identify the title of the job, where it is located, and the line of reporting. It includes a statement of job function, a short list of the principal responsibilities, and a statement of the basic duties involved.

The job description should be confined to stating the purpose of the job and to providing a simple catalogue of the duties. It should not relate to the performance of the individual doing the job, nor should it detail how the duties are carried out. (Job descriptions are given for a simple task—"Loading Gateman" in Appendix 2; and a more complex job—"Excavator Driver" in Appendix 3.)

4. Analyse the Training Requirements

The **analysis of training requirements** consists of three parts:

(a) Identification of the knowledge and skill required to do the job.

(b) The detailed breakdown of the skills and knowledge.

(c) A syllabus of training.

(a) Identification of Skills and Knowledge Required

This is an examination of each of the responsibilities and duties defined in the job description to identify the skill or knowledge required for their efficient performance.

Where the job consists of a series of tasks, the skills and knowledge content of each task should be identified individually. The items noted under "tasks" and "skill" should between them cover all the statements of duties in the job description.

In this section, the same items of skill and knowledge may be present in more than one element and these duplicated items can be considered as basic knowledge and basic skills. These basic items may usefully be built into a common off-the-job training programme, given prior to the later skill training. (In Appendix 2, it will be seen that all the duties in the Job Description are written into the analysis of training requirements appearing under "item" or "skill".)

(b) Skill and Knowledge Detail

Once the skill and knowledge required for each section of the job have been identified, these factors may be examined in greater detail.

The depth of this analysis will depend upon the number to be trained, and the complexity or the training difficulty of either the job as a whole or of specific tasks within the job. A variety of techniques are available for this analysis.

These are, in order of complexity:

SIMPLE— the Job Instruction Breakdown recommended in the Ministry of Labour T.W.I. course is probably the most straightforward method available (see Appendix 1).

MEDIUM— the Work Study or Method Study Breakdown (included in Appendix 2).

COMPLEX— the Skills Analysis Breakdown, a sophisticated method usually reserved for more complex operations (modified example in Appendix 3).

This stage of the analysis may be presented in the form of plans and sketches, short descriptions, multi-column breakdowns, and faults analysis schedules, as required. In cases of extreme complexity or training difficulty, the breakdown used may need analysis of the detailed movement of each limb and the use of each sense that is employed, and involve the production of a step by step operating manual.

Detailed breakdowns are not necessary for all aspects of a job. It could be that many of the skill elements in an analysis require no more than a sentence or two to give all the necessary detail. In some cases the manufacturer's operating, or maintenance, manuals are available and these may be satisfactorily substituted for any other form of breakdown.

(Check however that the manual includes relevant local practice, appropriate safety practices and factory regulations as these may have to be written in. Appendix 3 shows where manufacturers' maintenance manuals have been adapted.)

More detailed information on methods used in this stage of the analysis may be obtained from the Board's training staff.

(c) Syllabus of Training

The *syllabus of training* summarises the job training requirements *i.e.* the basic knowledge and skills, and the specific job knowledge and job skills. The syllabus of training gathers together all the elements, including safe practices, and presents these as teachable subjects.

From the detailed analysis it is also possible to identify additional training requirements in terms of suitable courses of further education.

The syllabus of training does not necessarily indicate the sequence in which the training requirements need to be taught. (The interrelationship of items in the syllabus and those in the general analysis of job training requirements can be seen in Appendices 2 and 3.)

5. Plan the Programme of Training

The preparation of the *job training programme* is the main objective of the analytical technique. The job training programme should contain all the items in the job training syllabus and give details of:

—the order in which they should be taught;
—to whom they will be taught;
—the training method to be used;
—the teaching aids to be used;
—the instructional time;
—where they will be taught;
—targets to be achieved at significant stages of the programme.

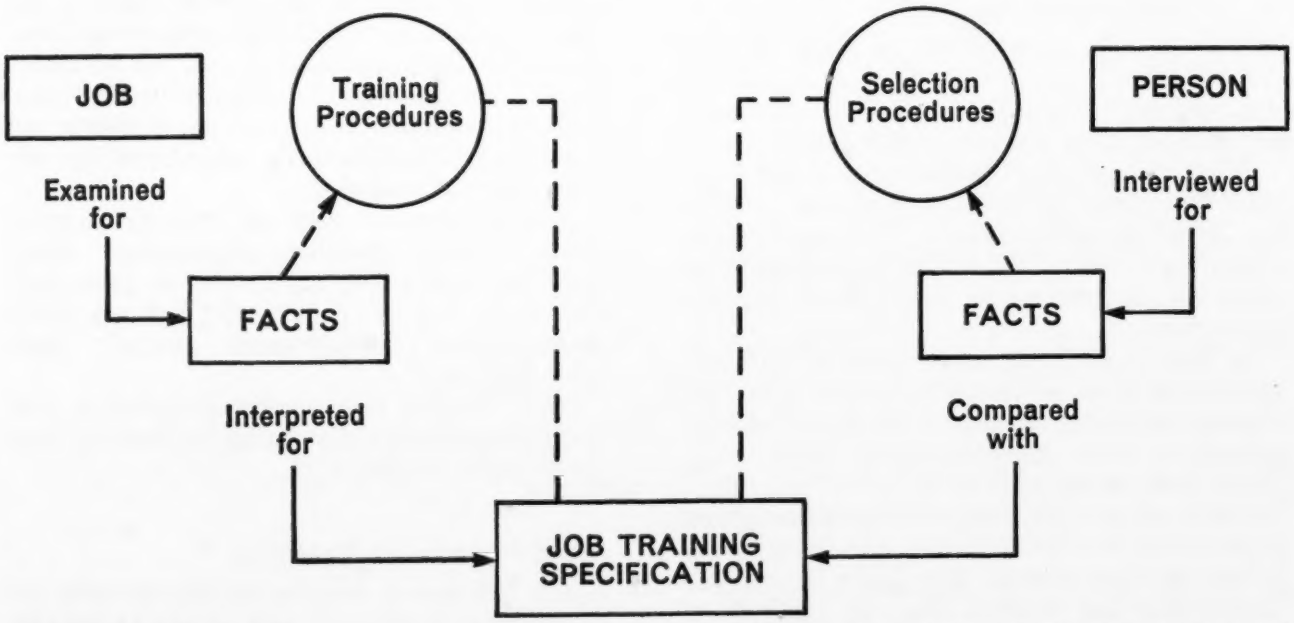
In addition the overall training time for the programme should be given. Instruction time is kept flexible, since it is dependent upon the adaptability of the trainees.

Preparation of the actual programme should be aimed towards optimum training results, irrespective of any difficulties in the organisation of the work. The latter should be reconciled later, either by changing the work organisation or by adjusting the programme.

Job Training Specification

So far, this paper has been concerned with the job, and its knowledge and skill content. If, as a result of the detailed analysis, the qualities desired of the individual performing the job are taken into consideration then a *job training specification* can be produced. This list of the personal qualities, technical qualifications and practical experience required for the job is of value in selection procedures. It may also show that before specific job training can be given, some pre-training is necessary.

The manner in which selection and training are linked in this way can be shown in the following simplified diagram:



CONCLUSIONS

The five step approach can be used for all categories of training and for all kinds of jobs.

Job descriptions, analyses of job training requirements, and job training programmes can be produced for all jobs using the standard approach outlined in this paper. The only variant will be in the depth of the analysis, and this will be entirely dependent upon the particular job under consideration. The entire documentation of a training scheme for a simple task may be covered on one sheet of paper. It is only the more complex operations that will require more detailed analysis, description and programming.

In all cases, the economics of the proposals must be carefully considered and two questions answered:

(a) Is the proposal sufficiently detailed to give effective training results?
and
(b) Is it more complex than it need be for the training required?

With acknowledgements to the Iron and Steel Industry Training Board.

APPENDIX 1

THE SIMPLEST METHOD OF PRODUCING A TRAINING SCHEME—JOB BREAKDOWN

The Training Within Industry (T.W.I.) Scheme for the training of supervisors has been promoted and developed by the Ministry of Labour and is a highly successful tool of modern management.

One of the five programmes, the T.W.I. Job Instruction course, deals with the supervisor's role as a trainer of his operatives. It presents in elementary terms a basic technique of job analysis and instruction and it has proved to be of equal value to the supervisor and to the operator (at any level), part of whose duties include the instruction of a trainee.

By making a systematic analysis of the job and noting down all of the important elements, the instructor can make certain that the trainee is taken right through the whole job and that nothing is omitted. He can also make sure that the trainee is always shown the right and safe way of doing the job, and is not introduced to bad practices or hazardous short cuts.

The benefits from following this approach to job instruction can be summarised as follows:

1. Preparation of job breakdown sheets makes the job holder, supervisor and manager think clearly about the way the job is carried out.
2. The best method of preparing the task is introduced as the standard method and all trainees are taught to follow this standard.
3. The most efficient way of using the materials and machines can be made a standard practice.
4. Consistent and uniform standards of quality can be established.
5. Safe methods can be standardised in the works and the operatives will know only the safe method of performing the task.
6. Training given using breakdowns gains the employees' confidence, helps to reach full output and earnings more quickly and will thus help to reduce the labour turnover.

This is probably the most economical efficient method of implementing sound, output-based training. In the following example, the T.W.I. job breakdown sheet is used and the task concerned is how to make the job breakdown.

Figure 1—Job Title: How to make a Job Breakdown

Stage (*what to do in stages to advance the job*)	**Instructions** (*how to perform each stage*)	**Key Points** (*items to be emphasised*)
1. Draw-up table.	Rule three columns. Allow space for column headings and job title.	Use this sheet as example.
2. Head the columns.	On top line insert the title of job. Insert: Column 1. "Stage." Column 2. "Instructions." Column 3. "Key Points."	Headings — summarise what worker needs to know to perform each job.
3. Follow through the job to be analysed.	After each step, ask yourself—"What did I just do?" Note places where the worker could go astray. Note items to be emphasised. Note hazards. Stress safety points.	Watch for steps which are performed from habit.
4. Fill in Columns 1, 2 and 3 as stage 3 above is performed.	Make brief and to the point notes.	Write notes clearly and concisely.
5. Number the stages.	Follow the sequence a worker must follow when learning the job.	Keep stages in order.
6. Follow the job through using directions in Columns 1 and 2.	Follow the instructions exactly.	Ensure directions are complete—never assume they are.
7. Check that all "Key Points" are included.	Record in Column 3 all points where the worker may be confused.	Review, and emphasise these "Key Points" decisively.

MEDIUM COMPLEXITY— DEVELOPMENT OF TRAINING PROGRAMME FROM STRAIGHTFORWARD ANALYSIS

Job Description

Job Title: Loading gateman.

Department: Crusher.

Responsible to: Plant Foreman.

Hours of Work: Day Shift 07.00–12.00 and 12.30–15.30. Five-day week.

Promotion: Plant Chargehand.

Function: The loading of crushed stone into railway wagons.

Responsibilities:

(i) Correct loading of each wagon, according to capacity.
(ii) Cleanliness of area under loading gate.
(iii) Obeying local rules and road regulations.

Duties:

Starting compressor in gate house.
Filling air reservoir.
Signalling readiness.
Controlling wagons.
Loading stone.
Stopping plant feed when no wagons available.
Clearing spill at end of shift.

An Analysis of the Job Training Requirements

Phase I—Identification of Knowledge and Skill Required to do the Job

Item	Skill	Knowledge
Filling air reservoirs	Operating star-delta starter and air control valves.	Sequence of procedure and basic working principles of compressor and pneumatic controls. Dangers associated with compressed air.
Loading stone	Checking sufficient wagons in retarder. Signals to crusher feeder. Control of loading gate to give even distribution of materials. Loading wagon to capacity. Letting down wagon and synchronising gate movement to avoid spill between wagons.	Holding capacity of retarder. Signalling procedure. Appearance and capacity of various railway company wagons.
Stop and restart	Assessing emergency of length of delay. Pressing of interlocked feeder conveyor button when no wagons available. Signalling for restart.	Importance of stopping plant only in emergency or long term delay.
Cleaning spill	Loading spill from under loading gate into wheel-barrow and emptying into waste hopper.	

Phase II—Detailed Breakdown of Skill and Knowledge

1. Filling the Air Reservoirs

Stages	Key Points
Check safety valve open.	Orange valve under air tank turned fully anticlockwise (follow red arrow).
Check valve to plant closed.	Blue valve on side of air tank fully clockwise (follow red arrow).
Remove lock from starter.	
Switch to start.	Pull lever up and hold—count five.
Switch to run.	Push lever down smartly. Check meter at steady 5 amps.
Close safety valve.	Turn orange valve full clockwise (follow green arrow for 'GO')
Build up to pressure.	Watch gauge on air tank until it reaches 50 lb/in^2.
Open valve to plant.	Turn blue valve fully anticlockwise (follow green arrow for 'GO').

2. Loading stone

Description	Training Requirements		
	Skill	Knowledge	Safety Factors
Check wagons	Ensure six wagons in retarder and check capacity of first.	Capacity of various types of wagons.	More than six wagons may cause runaway.
Check loading gate	Operate gate lever backwards and forwards.	Elementary principles of pneumatic control cylinders.	Excess bumping of gate will damage cylinders.
Signal Feeder House	Press bell once.	Signal code.	
Load	Move gate to fill leading end of first wagon. Slip retarder control to inch wagon down and fill middle of wagon. Repeat for rear of wagon. As load nears completion watch belt weigher indicator. When 10 cwt. below rated capacity slip wagon through retarder and at same time trip gate over to load into leading end of next wagon. Trip gate forward before filling rear of wagon to allow for bridging.	The reason for delay between weigher and actual load, hence allowance of margin under rated capacity of wagon.	Wagons should not be loaded above rated capacity.

Phase III—Syllabus of Training

1. **Basic Knowledge**
   The contents of Book 7—Workmen in Quarries.
   Appropriate sections of Mines and Quarries Act and Company Regulations.

2. **Basic Skills**
   Ability to operate simple controls and judge volumes and flow rate.

3. **Job Knowledge**
   The layout and principles of simple pneumatic controls.
   Capacity of different wagons.
   Safety limits of retarder.
   Problems arising in bad weather.
   Emergency procedures.

4. **Job Skills**
   Accurate control of loading gate.
   Recognition of types of wagon.
   Control of compressor.

5. **Background Knowledge**
   Layout of crushing plant and basic principles.
   Wagon control by retarder and brake stick.
   Fire fighting drill.
   Treatment in cases of shock.

6. **Further Education**
   None envisaged unless potential as a chargehand emerges.

Job Training Programme

Item	Skill Element	Knowledge	Where Taught	Instructor	Time	Remarks
Quarry and Company Regulations*		All relevant rules and legislation.	Crusher Office and private study.	Plant Foreman.	3 hours.	Check for assimilation.
			Works Canteen.	Safety Officer.	2 hours.	Occasional class for plant people.
Crushing Plant*		Background of plant working.	Plant and Plant Office.	Plant Foreman.	1 hour.	
Fire fighting and shock treatment.	Use of equipment.	General principles.	Works Canteen.	Safety Officer.	2 hours.	Occassional class.
		Location of equipment.	On Plant.	Plant Foreman.	1 hour.	
Wagon capacities.	Recognition of Types.	Capacity of each type.	Crusher Office.	Plant Foreman.	2 × ½ hour	Use of set of pictures.
Basic pneumatics.	Operating Compressor.	Basic theory.	Crusher Office.	Plant Engineer.	1 × ¾ hour.	Use machine in Fitting Shop for starting demonstration.
Starting compressor.	Using pneumatic control.	Safety factors.	Fitting shop and loading stage.		1 × ½ hour.	
					1 × ½ hour.	
Retarder	Handling wagons. Use of break stick.	Limits of retarder capabilities.	Retarder and loading sidings.	Sidings Chargehand.	½ day.	Practice in actual wagon handling to get feel of weight, etc.
Operating Loading Gate.	Use of gate controls. Filling wagons to right height.		On-the-Job.	Present job holder and foreman.	2 days.	½ day watching, under instruction. 1½ days, practice under instruction.

* New starters and those from other departments only.

COMPLEX— A TRAINING PROGRAMME BASED UPON DETAILED ANALYSIS AND BREAKDOWNS

APPENDIX 3

Job Description

Job Title: Face Shovel Driver (100RB).

Department: General Quarry.

Responsible to: Quarry Foreman.

Hours of Work: Day Shift. 07.00–12.00 and 12.30–15.30. Five-day week.

Promotion: Possible future foreman.

Function: To operate the face shovel excavator in order to load broken stone into dump trucks.

Responsibilities:

(i) The good running of the machine to avoid damage.

(ii) Maintaining the required rate of output, working the quarry face efficiently and maintaining a clean bottom.

(iii) The safety of the machine attendant and any person who comes within the working area of the machine.

(iv) Obeying the Quarry and local Regulations effecting work, machine and working area.

Duties:

Load stone into dumpers as required.
Ensure that the dumpers are fully utilised.
Move the machine when necessary.
Operate in a safe, efficient manner.
Undertake routine daily inspections.
Keep the machine cleaned, lubricated and properly maintained.
Assist with repairs.
Keep the machine's log of maintenance and repairs.
Maintain the loading sheet and give this to the foreman after each day's working.
Dig only broken stone and lay aside oversize material.
Trim loose material from the face and remove any overhangs.
Report irregularities and defects.

Analysis of the Job Training Requirements

Phase I—Identification of Knowledge and Skill Required to do the Job

Item	Skill	Knowledge
Operating the machine, moving and digging.	Ability to operate all the controls, i.e. hoist, clutch, slewing and travel.	Knowledge of the basic working principles. Level of control required to achieve results without damaging equipment due to excess wear, stress or strain.
Loading stone.	Digging only into blown face. Lifting oversize materials to one side and stacking neatly for secondary blasting. Trimming up face with bucket to remove loose stones and overhangs.	Limiting size of material sent to crusher. Even rocks well within apparent feed size can fall awkwardly and bridge crusher, causing lost production time. What this involves in costs. Understanding behaviour of face under various conditions. Types and qualities of acceptable material.
Efficient use of dumpers.	Loading to correct capacity. Preparation of rock pile before arrival of dumper. Requisition of dumpers according to availability of stone.	Importance of time keeping, scheduling of repairs and routine adjustments. An understanding of the costs of down time for excavators and idle time for dumpers and plant. Relationship of efficient use of dumpers, etc., to output bonus scheme.
Routine daily maintenance and inspection.	Cleaning, lubricating and maintaining the machine, inspecting for wear and breakages and daily checks of wire ropes.	Necessity for maintenance and lubrication. Inspection and maintenance procedure. Correct use of lubricants. Reference to maintenance manual and maintenance record for machine. Reporting procedure for defects.
Assisting with repairs.	Use of common hand tools.	Knowledge of basic lifting principles. Use of jacks, slings and hoists.
Maintaining records.	Filling in loading sheet. Filling in maintenance sheet.	Amount of information required and the purpose of keeping the records.
Overall safety of operation.	To operate without endangering himself or others.	Appropriate Mines and Quarries Regulations and local Managers' Rules.

Phase II—Detailed Breakdown of Skill and Knowledge—Machine Operation

1. Operating the Machine: Starting, moving, digging and loading.

Description of Task Elements	Training Requirements		
	Skills	**Knowledge**	**Safety Factors**
Starting Procedure	(a) To start up machine.	Close auxiliary transformer circuit brake, close isolating switch on control cubicle. Check all controllers in "OFF" position. Press start button on exciter control board. This closes the emergency and field contactors and starts up the exciter set, swing and hoist blower motors and oil pump motor. Set the exciter voltage to 125 by means of the shunt regulator (this will require readjusting as the exciter warms up in operation).	Remove Safety Notice from switch.
	(b) To make report in Mines and Quarries Book 236.	Report any defects found during inspection so that appropriate action can be taken by Quarry Foreman.	Do not operate machine if its working capabilities are suspect until checking with Quarry Foreman.
Operating the controls	(c) The correct use of the hoist machinery.	Dipper is hoisted by pushing the handle of the Hoist Controller away from the operator and lowered by pulling the controller handle towards the operator. During the digging cycle the loaded dipper is held whilst slewing by choosing such a position on the hoist side of the controller that the motor exerts sufficient torque to hold the dipper. The dipper should not be held in the air for long periods by this method, instead the hoist brake should be set by putting the Hoist switch to the "OFF" position.	All rotating machinery is brought to rest by pressing the "STOP" button either at the operator's switch station or at the exciter control board. The effect of this is to open the emergency contactor thus shutting both the main and exciter M.G. sets, blower motors, oil pump motor and opening the field contactor. It is strongly recommended that the "STOP" button is pressed by the operator if he temporarily leaves the machine.
	(d) The correst use of the crowd motion.	To crowd out, push the controller handle away from the operator. To pull in, pull the controller handle towards the operator. A brake mounted on the motor shaft holds the crowd motor stationary when the controller handle is in neutral.	
	(e) The correct use of the swing motion.	To swing the machine to the right, press the right side foot pedal. To swing the machine to the left, press the left side foot pedal. The machine is brought to rest by pressing down on the left pedal when swinging to the right and releasing pressure on the right pedal—and vice versa when swinging the other way—this operation is known as "plugging". To hold the revolving frame at rest whilst travelling, set the swing brake switch at the operator's switch station to "ON". Setting the swing brake switch to "OFF" releases the swing brake.	
	(f) To operate the dipper trip.	To open the dipper door push the button on the crowd control handle.	

Phase II—Detailed Breakdown of Skill and Knowledge—Machine Operation—*Continued*

Description of Task Elements	Training Requirements		
	Skills	**Knowledge**	**Safety Factors**
Digging and travelling	(g) To dig with the machine.	Set the hoist switch lever in the "ON" position, thus setting the hoist drum clutch and releasing the hoist brake. In the "OFF" position of this switch the hoist clutch is disengaged and the hoist brake set.	
	(h) To travel the machine.	To engage the propelling gear and release the propel brake, place the propel switch lever in the "ON" position. When this switch is returned to the "OFF" position at the end of the travelling period, the propelling gear is disengaged and the propel brake set.	Before travelling—make sure that the way is clear and safe, that no men or machines are in the intended path of the machine and that the trailing cable is clear of the machine tracks.
Hoist and Propel Switches	(i) Correct use of the hoist and propel switches.	Note that although the hoist and propel switches are entirely independent they will not be in the "ON" position simultaneously during normal operation. As a rule one will be "ON" and the other "OFF" and vice versa.	
Travel dog clutches	(j) Operating the dog clutches to steer the machine when travelling.	Each track on the truck frame is operated through a drive off the propel mechanism by a dog clutch. When both dog clutches are engaged the machine will propel straight ahead or in reverse by operating the hoist controller. To turn the machine to the left when travelling forwards, disengage the left track dog clutch, and vice versa for a right-hand turn.	
Operating hints	(k) To co-ordinate the use of the controls and operate the machine efficiently.	Actual digging with a shovel requires a balanced movement of all the controls so that two or more motions may be operated at the same time. The combination of hand and foot movements will be developed with practice so that a smooth efficient operating cycle can be obtained. There are many little "knacks" which will help to obtain the smooth efficiency desired. Keep shovel as near bank as safety permits, and always move up before it becomes necessary to "reach-out" with the dipper to get material. Spot trucks to keep swing as short as possible. Always load over back or side of truck. NEVER over the cab. Take shallow cut in face so that dipper is full when reaching top of face. Crowd out only sufficient to keep uniform depth of dipper in the face. Hoist dipper only just high enough to provide clearance for the door when bucket door catch is released. Move up whilst waiting for trucks whenever possible. Loosen material by cutting with the open dipper whilst waiting. Keep digger teeth sharp.	When loading trucks always load over the back or side. NEVER over the cab. When loading wagons NEVER swing the bucket over a locomotive.

2. Routine Daily Inspection

The manufacturers' hand-book for this machine lays down a clear and complete procedure for routine machine inspection and maintenance and the lubrication system to be followed. The procedure detailed in the hand-book should be followed exactly.

The following safety points must however be added.

(i) Before any maintenance or repair work, ensure that the power supply is switched off and attach the Safety Notice to the switch.

(ii) Always wear a safety helmet outside the cab of the machine.

(iii) Always wear gloves when handling any wire rope.

(iv) If safety guards are removed these must be replaced before the machine is started.

(v) Care must be exercised in adverse weather conditions when climbing the jib or descending from the machine.

3. The Elements of Size of Stone, Use of Dumpers, Maintenance of Records, etc.

Should be expanded in detail as required.

4. The Behaviour of the Face under Various Conditions

The skill element is the ability upon inspection to spot weaknesses and to be able to differentiate between good and bad materials. The knowledge content includes:

(i) The appearance of a clean face.

(ii) The appearance and nature of contaminents.

(iii) The action to be taken when dirt or clay is encountered.

(iv) When a face is blasted appears to stand tight and yet is workable.

(v) Which materials should not be worked when excessively wet.

(vi) When a face is likely to be unstable, i.e. due to strata, trim or weather.

(vii) The safe angle of batter on a rockpile in order to prevent it slipping.

Phase III—Syllabus of Training

1. Basic Knowledge

The contents of Book 7—Workmen in Quarries.
The appropriate sections of the Mines and Quarries Act.
Company Regulations.

2. Basic Skills

Ability to co-ordinate hand and foot movements.
Ability to read and follow line diagrams.
Use of hand tools.

3. Job Knowledge

General principles of working of excavator.
Operation and function of controls of excavator.
Principles of relevant motive power system (diesel engines or electric alternator, etc.).
Principles of maintenance and lubrication.
Emergency drills.
Detailed knowledge of face conditions.
Feed sizes acceptable to crusher.

4. Job Skills

Ability to fully co-ordinate use of foot pedals and hand levers to operate machine efficiently and safely.
Inspection of machine.
Carrying out routine maintenance.
Filling in record card.

5. Background Knowledge

General principles of quarrying.
Basic principles of fitting and workshop practice.
General functioning of a dumper (manoeuverability and capacity).
Basic economics of excavator and dumper working.
Fire precautions and fire fighting drills.
First aid.

6. Further Education

City and Guilds Certificate 387.

Phase IV—Job Training Specification

Pre-entry qualifications.

Physical and Mental Make-up

1. Intelligence level above that of basic operative.
2. Reasonable mechanical aptitude.
3. Quick reactions.
4. Good health and physique.
5. Good eyesight (with glasses if necessary).
6. Good hearing.

Attainment and Experience

1. Already holding City and Guilds Certificate 386 for quarry operatives.
2. General quarry experience.

Prior to Commencing Programme

1. Completion of company's general induction course.

Job Training Programme

Item	Skill Element	Knowledge	Where Taught	Instructor	Time	Remarks
Introduction		Basic function.	On machine.	Trained Driver.	2 days.	Not allowed to drive.
Quarry and Company Regulations.		All relevant rules and legislation.	In office and private study.	Safety Officer. Quarry Manager.	3 hours. 1 hour.	Check for assimilation.
Operating machine.	Basic handling. Co-ordination of movements. Routine inspection and maintenance.	Basic theory of excavators. Function of controls. Principles of maintenance. Safety precautions.	CITB Training Centre at Bircham Newton.	Centre staff.	2 weeks	Basic skills only.
Familiarisation with particular machine.	Adapting basic skills to specific machine, use of special equipment and lubrication gear.	More detailed knowledge. Routine maintenance. Inspection routines and requirements. Emergency drills.	On future machine super-numerary.	Trained Driver.	1 week.	Driving under constant supervision.
Knowledge of materials.	Identification of conditions of face.	Types of material. Effects of weather conditions. Quality requirements.	At all working faces.	Foreman.	5×1 hour.	Accompanying Foreman on daily rounds.
		Feed size to crusher.	At crushing plant.	Crusher Foreman and Feederman.	1 day.	Standing on feeder platform.

Job Training Programme—*continued*

Item	Skill Element	Knowledge	Where Taught	Instructor	Time	Remarks
Fire precautions.	Use of fire fighting equipment.	Theory and procedure of fire fighting and prevention.	At Office.	Safety Officer.	2×2 hours.	General course for all grades.
Record keeping.	Filling in cards.	Information required.	At Office.	Foreman and Clerk.	½ day.	
Maintenance and theory.		Detailed theory of machine functions. Theory and practice of maintenance and repair work.	Manufacturers Training Centre.	Centre staff.	2 weeks.	
Use of hand tools and workshop practice.	Use of tools.	Basic principles of workshop practice.	Workshops.	Craftsman Fitter.	As required.	Working under supervision when assisting with repairs.
Efficient working.	Use of time.	Economics of operation of machines and dumpers. Relationship with productivity bonus.	At office.	Quarry Manager.	2 hours.	
First Aid.	Shock Treatment.	Basic principles.	St. Johns Centre.	Doctor.	Evening Course.	May be timed to coincide with annual in-company course.
City and Guilds 367.		Quarry practice and supervision.	Grantham College for Further Education.	Staff.	Block Release.	To be introduced when man is ready.
Final tuition.	Reaching full skilled performance.		On machine, etc.	Trained Driver. Close general supervision.	1 week. 2 weeks.	
Assessment	Checking skill.	Checking knowledge.	Office assessment or records. Workshop assessment of machine condition. Discussion with trainee.			After 2–6 months.

EXAMINING THE JOB—a case study

Introduction

A company with several subsidiaries, and employing 800 people, decided that there were certain areas in which profitability could be increased by improved training programmes; and that these should be prepared as follows:

(a) Each job to be analysed by observing the job-holder at work and discussing his work with him;

(b) a job description for each job to be prepared from the job analysis; the job description to be an accurate and detailed factual account of what was involved in doing the work;

(c) from each job description, and after discussion with each man's superior, a job specification to be drawn up outlining the qualities, abilities, skills, knowledge, experience, motivation, aptitudes and interest which were required of the person who would perform the job effectively;

(d) the qualities, abilities, etc., of the man at present holding the job to be compared with those outlined in the job specification, the results of this comparison indicating the areas in which the man's weaknesses lay;

(e) a training programme then "tailored" to suit particular requirements and to bring each man up to the standards specified in the job.

Method of Approach

Lists of questions were developed to be put to job holders during the first stages of examining the job. It was felt that this would not only yield valuable information about job content, but would also contribute to the job holder's co-operation during the whole process of job analysis.

Some of the questions were common to all jobs:

1. Which department, section or shop do you work in/control?
2. What is the title of your job?
3. To whom are you immediately responsible?
4. Describe the various elements or tasks in your job as fully and accurately as possible.
5. Which of these take up the most time, and which are the most difficult to do?
6. Which tasks are routine or repetitive; how regularly do you do them?

These were followed by the following questions related to specific occupational groups:

(a) for jobs in the commercial and clerical sector

1. What equipment or machines do you use and how often?
2. What contacts do you have with people, within and outside the organisation? What is the purpose of these contacts?
3. How did you learn the job, and over what period of time?
4. Do you do all your work under the direct supervision of your superior?
5. Are you only expected to work to instructions or do you do work which calls for the use of your own initiative? If so, explain.
6. Does your work mean you have to use the telephone a lot? If so, for what purpose?
7. Do you feel that what you have said so far gives a full description of your job or can you now think of any additional tasks or duties?

(b) for production and ancillary occupations

1. How did you learn to do the job and over what period of time?
2. Name any tools, equipment or machines which you use, and say how often, if you can.
3. In which parts of the work is quality most important?

4. What work requires the use of your hands?
5. Is there always someone present who supervises your work?
6. If not, are you sometimes left to work on your own initiative? Give examples.
7. Do you feel that you have now described your work fully, or do you have any additional tasks or duties?

(c) for foremen and senior chargehand jobs

1. For how many employees are you responsible?
   (a) completely (b) partly
2. What tools, equipment, machines are you responsible for? Do you personally have to use any of these machines?
3. With whom does your work bring you in contact? For what purpose?
4. What background experience or knowledge is necessary for your work?
5. Are you fully responsible for both the work and the behaviour of the men under you? If not, please explain.
6. What authority do you have to take disciplinary action in the case of misbehaviour by any of your men?
7. Do you assign work to each man? If so, is this hourly, daily, weekly, etc., or as required?
8. Are you responsible for ensuring that the quality of the work done in your section is of the required standard? If so, how often do you inspect the work in progress?
9. Do you deal with queries amd complaints from the men?
10. Are you responsible for ordering tools and materials for your section?
    (a) directly? (b) indirectly?
11. Do you spend time doing similar tasks to those done by your men, or are you responsible only for ensuring that the work progresses smoothly and efficiently, and dealing with any difficulties which may arise? Please give examples of type of difficulty, e.g. machine breakdown, labour problems.
12. Do you have any writing to do? (Filling in forms, records, reports, etc.).
13. How do you receive your instructions, and from whom?
14. Are you responsible for ensuring that working conditions, machines, etc., are safe, and for issuing special protective clothing to the men when necessary?
15. Are you responsible for the introduction of new employees to your section and for their training?
16. Do you feel that you have described your job fully or do you have other tasks or duties?

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February 1968.

Printed by Hills & Lacy Ltd., London.